Observations of Evapotranspiration in the Russian River basin, California

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ABSTRACT

The NOAA Hydrometeorology Program (HMT) in collaboration the California Department of Water Resources has deployed a network of soil moisture observing stations in the Russian River basin. The basin encompasses 1,485 square miles within Sonoma and Mendocino Counties, California. The soil moisture observations have been used to investigate the hydrological response of the basin to heavy wintertime precipitation associated with land falling atmospheric rivers (ARs) during the winter-spring seasons, and in the evaluation of the Sacramento Model Heat Transfer (SAC-HT) soil moisture parameterization used by the NOAA National Weather Service Office of Hydrologic Development Research Distributed Hydrological Model (HL-RDHM).

Evapotranspiration is a crucial process that must be accounted for in hydrological modeling. Evapotranspiration is controlled by both surface meteorological forcing, canopy, and soil water storage. Thus, is advantageous to have collocated in-situ observations of net radiation, sensible, latent, and ground heat fluxes when evaluating hydrological models. The HMT program recently added such observing capability to one of the observing sites located near the headwaters of the Austin Creek tributary of the Russian River. The site is located 15 km northwest of Cazadero, CA.

Beginning in May 2012 soil moisture and temperature probes were added at depths of 5, 20, 50 and 100 cm. Probes at 10 and 15 cm have been in place since December 2008. A sonic anemometer, and fast response gas analyzer were installed at the 9-m level of a tall tower. A suite of radiometers capable of making high-accuracy surface radiative flux observations became operational, in addition to ground heat flux plates.

In this presentation we will compare direct tower eddy-correlation observations of evapotranspiration with potential evapotranspiration (PET) estimates simulated by HL-RDHM in the Austin Creek sub basin. The preliminary results show that the 6-hr time step used in the model leads to systematic errors in the PET estimates. In addition, the HL-RDHM PET estimates can become unrealistic if the model PET is increased to improve HL-RDHM wintertime streamflow simulations.

Key Words: evapotranspiration, soil moisture, distributed hydrologic modeling, Russian River basin, surface energy balance